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September 27. Olympia (Wash.), 1:30 A.M.
October 2. College Park, $8^h\ 41^m\ 57^s.3$ A.M., reported by Professor H. D. CURTIS; San Francisco.
October 5. Stockton, 7:44 P.M.
October 17. Mt. Hamilton, $3^h\ 30^m\ 26^s$–31^s P.M. (III); San José.
November 21. Randsburg, 11:30 A.M.; 12:30 P.M.
December 6. Forest Grove (Oregon), 8:30 P.M.
December 10. Mt. Hamilton (in night).
December 15. Waterville, Lakeside (Wash.).
December 16, 17, 20. Lakeside (Wash.), 6 A.M.
December 23. Mills College, 5:15 A.M. Reported by Professor KEEP.
December 26. Centerville, 7:06 A.M.

LATITUDE WORK WITH THE FAUTH TRANSIT INSTRUMENT OF THE LICK OBSERVATORY.

By HEBER D. CURTIS.

At the suggestion of Dr. HOLDEN, I last summer entered upon a trial of the four-inch FAUTH transit of the Lick Observatory to determine its value as a zenith telescope for finding the latitude.

The latitude level found in place upon the transit was rejected because of irregular curvature. After tests on all the level-tubes in the possession of the observatory, the tube "REPSOLD, No. 1491" was selected as being the most regular. Nearly six hundred readings were made on the REPSOLD level-trier belonging to the observatory, to determine the value of the division of this level, at temperatures ranging from 45° to 83° F. It was found to be a tube of very regular curvature.

In reversing the transit with the aid of the carriage, it is necessary to place the telescope in a horizontal position, thus bringing the level-tube to a position greatly inclined to the horizon, invariably shortening or lengthening the bubble, and making it necessary to bring back the bubble to a more moderate length. It therefore became necessary to determine whether any factor of change in the value of a level division could be found to depend upon change in bubble length. Accordingly the length of the bubble was varied in the different series of trials from 14.47 mm. to 45.90 mm. The resulting equations of condition gave, as a value of this factor, $0''.0004\ (L—28.3\ \text{mm.})$—practically zero.

The temperature factor was much more interesting. Above 52° the value of one division may be represented by the formula,—

$$d = 1''.358 + (60^\circ—T^\circ)\ 0''.002.$$

Below 52° (no opportunity was found below 45°) the change is much more rapid, all values being best satisfied by the formula,—

$$d = 1''.374 + (52^\circ—T^\circ)\ 0''.021.$$

The probable errors of all the mean values of the different series used in the formation of these equations are small, in only one case exceeding $0''.005$. The tube was twice removed from its enclosing tube, and tried without it, to determine whether any strain in the mounting caused the curious increase below 52°. Some internal strain in the glass seems the best explanation.

No evidence was found, from a considerable number of transits of stars, to warrant altering the assumed value of one revolution of the micrometer screw: $2^s.931 = 43''.96$. Tests were, however, made on the micrometer screw for periodic error. The micrometer box was placed on the measuring engine, and set at quarter-revolutions, from − 20 to + 20 revolutions. At each setting four bisections were made with the microscope of the measuring engine, and the averages of these sets of readings were so grouped as to bring all readings of the same quarter-revolution of the micrometer head together. The screw of the micrometer, as well as the screw of the measuring engine, worked against the springs. The following values were found (in terms of one revolution of the measuring engine micrometer screw):—

0.00 to 0.25	$1^r.2189$
0.25 to 0.50	1 .2195
0.50 to 0.75	1 .2231
0.75 to 1.00	1. 2238

Mean, 1.2213 ± 0.0010

This periodic irregularity is entirely insensible; the maximum variation between readings in the first and fourth quadrants, due to this cause, would be but $0''.021$, and, in the long run, the resulting errors would tend to balance each other. There was no evidence of variation in the screw at different portions of its length.

The latitude observations themselves show that the instrument as it stands is not well adapted for use as a zenith telescope. As it is now arranged, much time is lost in reversal, and the greatest care must be taken, else the latitude level, which is a later addition, will strike the clamp. The fact that the level-tube must be greatly inclined to the horizon in reversing, is most objectionable, as errors are almost certain to be introduced. With some arrangement by which the reversal could be easily and rapidly accomplished without altering the inclination of the telescope, this instrument would doubtless give good results in latitude work.

In all, after rejecting numerous obviously erroneous observations, 116 were used.

The resulting value of the latitude of the transit instrument was found to be 37° 20′ 24″.4, with the large probable error of ± 0″.31.

UNIVERSITY OF THE PACIFIC,
COLLEGE PARK, CAL., February, 1898.

THE ROYAL OBSERVATORY, EDINBURGH, SCOTLAND.*

BY R. G. AITKEN.

About the middle of 1888 the Earl of Crawford and Balcarres offered to the Government, for use in a national Scottish observatory, the splendid and valuable equipment of his own observatory at Dun Echt.

The Government accepted the gift; but the space available in the Royal Observatory on the Calton Hill being entirely inadequate for the housing of the instruments, a new building became necessary; and eventually the present site of three and one half acres on the eastern slope of Blackford Hill was chosen. The plans of the new observatory were prepared by Mr. W. W. ROBERTSON, of Her Majesty's Board of Works, and the build-

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*This description is based upon an article by Mr. THOMAS HEATH, B. A., Assistant Astronomer, Royal Observatory, Edinburgh, read before a meeting of the Royal Scottish Society of Arts, November 23, 1896; a letter from Mr. Heath to Professor HOLDEN; and an article in the *Scotsman*, April 4, 1892. Many of the sentences are directly quoted from one or another of these papers.